APPLICATION NOTES

Series 50 Solid State Relays

WIRING — NISTORPAC ON/OFF CONTROL

NistorPac Terminal Assignment

The 50-NP-AC5 has six wiring terminals on its Eurostyle screw block, accepting two conductors per terminal position:

- **A, F** — Load (lamp, solenoid, motor, relay coil)
- **B, E** — Line voltage (24–240 VAC, 50/60 Hz)
- **C, D** — Sensor switch (ERECTA SWITCH® reed contacts)

Wire gauge: AWG 20 minimum for sensor circuit (C, D). AWG 18 minimum for line and load circuits (A, B, E, F). Fuse line and load circuits per applicable electrical codes.

Basic ON/OFF Circuit

Connect the reed switch sensor leads to terminals C and D. Connect load to A and F. Connect line voltage to B and E. When the sensor closes, the load energizes. When the sensor opens, the load de-energizes. No additional components required for resistive loads.

For inductive loads (solenoid valves, motor starters, contactor coils), the NistorPac handles the inductive switching internally — no external snubber or flyback diode required on the load side. This is the primary purpose of the relay.

Wiring Best Practices

Use Eurostyle wiring ferrules (50-BP-F-XX) on stranded wire ends to prevent strand splaying in screw terminals. Ferrules are sold separately as ERECTA SWITCH accessories.

Keep sensor wiring (C, D) physically separated from line/load wiring (A, B, E, F) to minimize noise coupling into the sensor circuit.

Sensor Compatibility

The NistorPac sensor input (terminals C, D) accepts any dry-contact SPST switch with:

- Contact resistance when closed: ≤ 300 Ω
- Sensor circuit current: 0.01 A typical
- Input sense voltage: 5 VDC

Compatible sensor types: ERECTA SWITCH® reed switches (Series 5, 10, 15, 20), Series 11 bimetallic temperature switches, dry-contact pressure switches, magnetic door contacts, mechanical limit switches, and any other passive SPST sensor meeting these parameters.

Application Environment

NistorPacs and LatchPacs operate at 100% duty cycle over **0°F to 140°F** (–18°C to 60°C). These devices are continuously powered and reasonably tolerant of transient power line noise.

Important: Do not use in any application where a momentary false operation could cause injury to personnel or damage to equipment. Rapid ON/OFF cycling is possible under noisy line conditions.

Mounting

Both NistorPac and LatchPac mount via the two through-holes in the housing corners. Mount on any flat surface — DIN rail adapter, panel, bulkhead, or directly on a heat sink surface. At loads above 0.75 A, the mounting surface becomes part of the thermal management system — use a thermally conductive metal surface and silicone grease at the interface.

LatchPac Terminal Assignment

The 50-LP-AC10 has eight wiring terminals:

- **E, F** — Load (pump motor, solenoid valve, valve actuator)
- **G, H** — Line voltage (24–240 VAC, 50/60 Hz)
- **A, B** — Start sensor switch
- **C, D** — Stop sensor switch

Wire gauge: AWG 20 minimum for sensor circuits (A–D). AWG 18 minimum for line and load circuits (E–H). Fuse line and load circuits per applicable electrical codes.

Start Low / Stop High — Pump Fill Pattern

The most common LatchPac pattern fills a tank from low level to high level:

- Lower switch (Start) = N.O., configured open on rise
- Upper switch (Stop) = N.O., configured open on rise
- When tank drains to low level: lower switch closes → Start conditions met
- LatchPac latches ON → pump starts filling
- Pump runs through full fill cycle, both switches open
- When tank reaches high level: upper switch closes → Stop conditions met, relay unlatches → pump stops

Start High / Stop Low — Pump Drain Pattern

For sump drain or overflow control — pump runs when tank is full, stops when empty:

- Upper switch (Start) = N.C., configured close on rise
- Lower switch (Stop) = N.C., configured close on rise
- When tank fills to high level: Start conditions met → relay latches ON → pump starts draining
- Pump runs until low level: Stop conditions met → relay unlatches → pump stops

> **LatchPac — Coming Soon**
>
> The 50-LP-AC10 LatchPac is in final development. Full wiring and application information is published here for design planning purposes.
>
> Contact **sales@compac.com** to register interest or discuss your application.

Why Wide Differential Matters

Single-switch ON/OFF level control causes short cycling — the pump turns ON and OFF repeatedly as the level oscillates around a single set point. Each start draws inrush current and stresses the pump motor. Wide differential eliminates this: the pump runs continuously through a full fill or drain cycle, with a substantial level difference between the start and stop points.

The LatchPac holds relay state **independent of sensor state** between latch and unlatch events. Even if the fluid surface sloshes and briefly trips a sensor, the relay holds — preventing nuisance cycling that would occur with direct reed-switch-to-load wiring.

ERECTA SWITCH® Integration

Series 10 extended-stem assemblies with two 10-782 level switches at user-specified heights provide the Start and Stop inputs directly. The LatchPac, two Series 10 switches, and an extended-stem assembly form a complete wide-differential pump control system — no PLC, no timer, no external logic required.

See the Series 10 Application Notes for the complete pump control wiring diagram.

OEM USE CASE SCENARIOS

1. Chemical Dosing Pump Control

Product: NistorPac 50-NP-AC5

Scenario: Peristaltic dosing pump must activate when a level sensor detects low chemical concentration tank level.

Solution: Series 10 KR level switch (N.O.) → NistorPac terminals C/D. Pump motor → terminals A/F. When level drops to set point, reed closes, pump energizes. When level rises past set point, reed opens, pump stops. NistorPac protects the reed from pump motor inrush.

2. Sump Pump Wide-Differential Control

Product: LatchPac 50-LP-AC10 *(Coming Soon)*

Scenario: Sump pump must run continuously from high level to low level without short cycling on float bounce.

Solution: Two Series 10 PP switches on extended stem assembly — lower switch to A/B (Start), upper switch to C/D (Stop). Pump to E/F, line to G/H. Pump latches ON at low level, runs full drain cycle, unlatches at high level. LatchPac holds state through any float bounce.

3. Solenoid Valve Pilot — Level Control

Product: NistorPac 50-NP-AC5

Scenario: Fill valve solenoid must open when tank drops below set point and close when level is restored.

Solution: Series 10 AC level switch (N.C.) → NistorPac. Solenoid coil → load terminals. NistorPac handles the inductive solenoid load — no snubber required. Direct reed-to-solenoid wiring without relay protection would weld the contacts within weeks.

4. Overheat Interlock Relay

Product: NistorPac 50-NP-AC5

Scenario: Heater must be cut when process fluid reaches 80°C. Series 11 temperature switch provides the sensor signal.

Solution: Series 11 KR, Type C, 80°C set point → NistorPac sensor terminals. Heater contactor coil → load terminals. When temperature reaches set point, Series 11 opens (N.C. contact), NistorPac de-energizes, heater contactor drops out. Fail-safe: broken wire also de-energizes heater.

5. Cooling Tower Basin Level

Product: NistorPac 50-NP-AC5

Scenario: Makeup water solenoid valve must open when cooling tower basin drops to low level.

Solution: Series 10 PP level switch (N.C.) → NistorPac. Makeup water solenoid → load. When basin drops, float drops, N.C. contacts close, NistorPac activates solenoid. When level is restored, float rises, contacts open, solenoid closes.

6. Chemical Tank Fill — Wide Differential

Product: LatchPac 50-LP-AC10 *(Coming Soon)*

Scenario: Chemical day tank requires fill pump to run from empty to full without operator intervention, with no short cycling near the set points.

Solution: Two Series 10 KR switches on extended stem — low level as Start, high level as Stop. LatchPac latches fill pump ON at low level, holds through full fill cycle regardless of surface agitation, unlatches at high level. PVDF Kynar floats handle aggressive chemistry.

7. Flow Verification Interlock

Product: NistorPac 50-NP-AC5

Scenario: Downstream process equipment must not operate unless coolant flow is confirmed.

Solution: Series 5 flow switch → NistorPac sensor terminals. Process enable relay coil → NistorPac load terminals. Flow present → NistorPac energizes → process enable relay closes → equipment runs. Flow lost → NistorPac de-energizes → process equipment stops immediately.

> **Design Assistance**
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> Compac provides free engineering consultation: relay selection, sensor pairing, heat sink sizing, wiring review, sample qualification.
>
> Contact **sales@compac.com** with your application load current, sensor type, and control logic requirements.

RELAY SELECTION GUIDE & SENSOR PAIRING

Series 50 relays are compatible with any passive SPST dry-contact sensor that meets the input specification. The table below covers common ERECTA SWITCH® sensor pairings and their typical relay selection.

Sensor	Relay	Load	Pattern
Series 10 level switch (single)	NistorPac	Solenoid valve, pump, alarm	Direct ON/OFF at set point
Series 10 level switch (pair)	LatchPac *(Coming Soon)*	Pump motor, fill valve	Wide-differential, anti-short-cycle
Series 15 level switch	NistorPac	Solenoid valve, indicator relay	Side-mount ON/OFF level control
Series 20 Bestact level switch	NistorPac	High-current solenoid, motor	Direct inductive load switching
Series 5 flow switch	NistorPac	Process enable relay, alarm	Flow presence/absence interlock
Series 11 temperature switch	NistorPac	Heater contactor, alarm relay	Thermal limit cutoff or enable
Dry-contact pressure switch	NistorPac	Compressor, pump, alarm	Pressure threshold ON/OFF
Magnetic door/panel switch	NistorPac	Machinery enable circuit	Safety interlock

When to Use NistorPac vs. LatchPac

Use NistorPac when: one sensor directly controls one load, load follows sensor state, no hysteresis required, simplest possible wiring.

Use LatchPac when: pump or valve must run continuously between two set points, short cycling must be prevented, two independent level sensors define the start and stop points, wide differential between ON and OFF is operationally required.

Use neither when: the switched load is DC, the load exceeds 10 A continuous, or the application requires multi-pole switching — in those cases a mechanical relay or contactor is appropriate.

Heat Sink Sizing Reference

Both relays require supplemental heat sinking above 0.75 A continuous load. Required single-side aluminum heat sink area:

Continuous Load (A)	Min Heat Sink Area (in²)
≤ 0.75	Built-in sufficient
1.0	1.6
2.0	6.3
3.0	14.1
5.0 (NP max)	39.1
10.0 (LP max)	156.3

Formula: (Amps × 1.25)² sq in, 1/16″ aluminum, single side, ambient 0–120°F. Use silicone grease at interface.